UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Summary Review of Monthly Reports*
for
SOIL CONSERVATION SERVICE RESEARCH**

AUGUST 1944

EROSION CONTROL PRACTICES DIVISION

Conservation Experiment Stations Section

J. W. Slosser of Presque Isle, Maine reports: "The new disc harrow was fitted with four steel oil drums, one per section, and filled with water for ballast. The operation of disking old sod followed by deep sub-surface tilling was completed on A_4. The sub-surface tiller, equipped with 5-6" and 7-8" duck-foot sweeps, operated with less than expected difficulty on the stony area, although an average depth of 7" was attained. The operations produced a surface apparently ideal for Aroostook winter and spring conditions. Following the above operations, the soil presents a very rough textured surface with small clumps of sod dispersed very uniformly."

Harley A. Daniel of Guthrie, Oklahoma reports: "The steers were removed from the pastures at Guthrie on August 21 after a grazing period of 120 days. The cattle on the cleared scrubby oak land made a gain of 61.8 pounds per acre, while those on revegetated, badly eroded land made 41.1 pounds and the ones on the reseeded, formerly, cultivated land 41.2 pounds. The cleared virgin land produced 1.4 tons of hay per acre, while the revegetated, badly eroded land produced only .57 of a ton. Sprout counts made on scrubby oak land, which was cleared in July 1943, mowed in the fall and again in May of 1944, show a reduction of 6.48 per cent in the number of various types of woody plants 2 inches or less in diameter. Observations indicate that a good grass density is developing on such areas. A study of the establishment of bluestem grasses on formerly cultivated land shows that a seed-hay mulch had 2.4 times more grass density than an adjacent area seeded with the same quantity of seed without mulch."

John T. Bregger of Clemson, South Carolina reports: "Peach picking was completed with a total of 3,960 bushels. Approximately half of this production was harvested from plot trees where each picking was weighed and yields recorded on an individual tree basis.

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"While yield data have not yet been completely analyzed, a casual study of them indicates the following rather wide differences between cover crop and soil management treatments:

(1) Winter cover crop of vetch gave much greater yields than rye cover crop.
(2) Annual cover crop of soybeans-Sudan grass gave superior yield to Kobe lespedeza (reseeded annually without cultivation).
(3) Periods of 1-1/2 and 3 months early summer cultivation resulted in increased yield over the minimum tillage involved in planting the summer cover crop immediately after turning down winter cover crop.

"It is becoming more and more evident that the vetch plots are highest in fruit yield because of the large amount of organic nitrogen added to the soil, in view of the fact that non-organic fertilizer applications have been the same for all plots. Foliage color and tree growth indicate the same thing."

George W. Hood of Batesville, Arkansas reports: "The relative value of summer legumes as soil building crops to increase the yield of seed cotton where the entire plant is plowed under versus where a hay crop is removed before turning under. Sudan grass was used as a non-leguminous check.

Crop	Disposition	Average increase in pounds of seed cotton per acre over check
Cow peas	Removed for hay	82
	Plowed under	291
Soybeans	Removed for hay	87
	Plowed under	248
Mung beans	Removed for hay	38
	Plowed under	182
Crotalaria	Cut and removed from field	198
	Plowed under	320
Velvet bean	Removed for hay	137
	Plowed under	343

"A study of these figures shows the value of legumes for furnishing organic matter, and the increase in production when turned under. It emphasizes the fact that increased yields are in proportion to the amount of organic matter turned under and incorporated in the soil. It also shows that certain species of summer legumes have higher value as soil building crops than others."

J. B. Pope of Tyler, Texas reports: "Vetch and cowpeas increase corn yield--The past season was very unfavorable for corn production in East Texas, though vetch and cowpeas again proved their value by increasing the corn yield 17.3 bushels per acre under adverse weather conditions. The corn yield in the three-year cropping system of corn, cotton, and oats with vetch following corn as a winter cover crop and cowpeas following oats as a summer soil-improving crop was 36.1 bushels per acre in comparison to only 18.8 bushels per acre without vetch and peas in the system. Similar increases in corn yields resulting from the residual effects of vetch and cowpeas have been obtained over a period of years."

Oren R. Neal of New Brunswick, New Jersey reports: "For the fourth consecutive year there was found an increase in yield on the less eroded areas of this field. A summary of yields from different depths of surface soil is shown in the following table:

Yields of potatoes from different depths of surface soil

Year	Surface soil depth -			
	0-3"	3-6"	6-9"	Over 9"
	Bushels per acre			
1941	314	345	368	372
1942	235	260	282	314
1943	193	190	193	203
1944	141	152	162	159
Average	221	237	251	262

"The average annual difference in yield between the best area and the most severely eroded area, under identical systems of management, has been 41 bushels per acre."

O. K. Barnes of Laramie, Wyoming reports: "The 1944 grazing results to date on the pastures comparing mechanical treatments on native range to non-treated range are as follows:

	Grazing rate up to Aug. 31 Sheep days per acre
Pitted with eccentric disc (1942) * (average of 2 pastures)	85
Non-treated range * (average of 2 pastures)	53
Pitted with eccentric disc (1939) **	63
Grooved, 2 ft. intervals (1939) **	63
Non-treated range **	44

* Grazing season completed for 1944.
** Not fully utilized and grazing will be continued into September.

"The 2 pastures pitted in 1942 supported 60 per cent more sheep than the 2 non-treated pastures for the season of 1944. The utilization studies have not been made yet, but it is apparent that the pitted pastures have a greater carryover of feed than the non-treated pastures. To date the pastures pitted and grooved in 1939 have supported over 40 per cent more sheep so far this year than the non-treated pasture. However, it appears that the effects of these treatments applied in 1939 are decreasing in this sixth year."

Charles J. Whitfield of Amarillo, Texas reports: "Stubble mulch and wheat production--The chief motive back of the development of stubble mulch tillage in the Southern High Plains was protection against soil blowing which is an annual potential hazard. It was felt that certain operation difficulties and even a slight reduction in yield some years would be more than compensated for by the protection if it could be accomplished by this method. Up to the present time, this method has not only given ample protection from wind erosion but has given higher yields than clean tillage. It must be admitted that the method presents certain minor field operation problems not encountered with clean tillage methods but these problems have been reduced considerably in the past two years of study. Both wheat and sorghum fields on the station are tilled so as to leave the surface of the soil protected with stubble.

"Wheat land on the station going back to wheat this fall was tilled the second time the last of the month. Rains were sufficient during August to sprout most of the wheat shattered by the 1944 harvest so that it could be destroyed by this operation. Most of these areas were packed with the Campbell sub-surface packer after the second operation to firm the seedbed, conserve moisture already in the soil and to make better conditions for drilling. In the drier farming areas, sub-surface packing immediately following the last tillage operation pays most seasons. This appears to be particularly true with stubble mulch tillage."

R. E. Dickson of Spur, Texas reports: "In this year with a normal but poorly distributed rainfall and a very low reserve of soil moisture two bright pictures have appeared on the station. One was in the syrup pan area. A rain back in June caused water to flow onto this area which was held for several days to build up a good storage of soil moisture. Cotton and sorghum crops planted in this area have continued growth throughout the drought period in August and were at the end of the month in the process of maturing good crops. No crop failures have occurred on this area since it was built in 1931. The second bright spot was a nine-acre alfalfa area which uses excess water from the roadway. Three cuttings have already been made from this marginal alfalfa area of which the first two, totaling 260 bales, were used for hay; and the third, which was stacked in cocks to cure, will be threshed for seed. Estimated yield of seed is around 100 pounds per acre. Prospects for a fourth cutting are excellent due to rains falling the last week in August."

Joel E. Fletcher of Tucson, Arizona reports: "A reconnaissance was made of low infiltration areas on the upper San Pedro Gila river areas in conjunction with the District Conservationists for these areas. The poor penetration of irrigation of water seems to be largely due to three types of condition, namely, puddled layers somewhere in the horizon, a naturally dispersed soil, and tight clay soils."

C. A. Van Doren of Dixon Springs, Illinois reports: "Approximately 1-1/2 acres of alfalfa-brome were seeded on land prepared by plowing and by disking. The land received four tons of limestone and 500 lbs. per acre of 32 per cent superphosphate. The land had received no previous treatment, and was overgrown with a well established stand of brome sedge. These plots were seeded to test the application in southern illinois of the Ohio recommendations for establishing alfalfa-brome on sedge land. It is planned to make a similar seeding during each of the next two seasons on adjacent contour strips on the same field."

T. C. Peele of Clemson, South Carolina reports: "Tillage tests with corn are being conducted at Clemson in which the effects of maintaining plant residue from winter cover crops on the soil surface as a mulch during the growth of corn are compared with treatments in which the cover crops are either disked in or plowed under. The test plots are 1/15 acre in size and all cultural operations are performed with tractor equipment.

"Only one erosive storm has occurred since the corn was planted this year. This storm occurred on August 17 and the runoff and erosion data from it are shown in the following table:

"Influence of cultural practices on runoff and erosion from corn during 1.37 inches of rainfall on August 17, 1944

Tillage method	Preceding cover crop	Runoff	Soil loss
		Pct.	Lbs. per acre
Mulch	Vetch and rye	1.06	46
Disked	Vetch and rye	10.55	377
Plowed	Vetch and rye	25.48	420
Plowed	None	55.33	1,693

"Rainfall since April has been from 20 to 50 per cent below average each month. The runoff and erosion data show that the mulch method is the most effective of any of the tillage treatments, and that the winter cover crops was much more effective than no cover crop even when it was plowed under."

G. M. Browning of Ames, Iowa reports: "Stand counts have been completed on the contour studies at different locations in the State with the exception of those in Jasper County. In areas where there was excessive rainfall early in the season the number of stalks on the up and down hill rows average from 5 to 15 per cent less than on adjacent rows planted on the contour."

T. L. Copley of Raleigh, North Carolina reports: "Some timely data recently compiled from the control plot experiment of the old Statesville Station, showing the value of winter cover crops and the time of the year they are most effective are shown in the table below:

Soil losses with and without winter cover crops by seasons for 6-year period 1933 - 1938 at the Statesville erosion station

Season	Corn following rye and vetch	Cotton following no winter cover	Soil saved by use of winter cover	
	Tons per acre	Tons per acre	Tons per acre	Pct. of annual total
Dec. through Feb.	.26	.54	.28	1.5
Mar. through May	.66	2.42	1.76	9.9
June through Aug.	8.14	23.93	15.79	88.6
Sept. through Nov.	1.85	1.83	-0.02	--
Annual total	10.91	28.72	17.81	

"It may be noted that soil loss during the fall and winter is very low, regardless of whether cover crops are used or not. The residual effect during the summer after they are turned is very marked. It is apparent that more emphasis should be placed on the time of benefit when winter cover crops are recommended."

Edgar C. Joy of Brookings, South Dakota reports: "A farmer in North Dakota has developed a gadget to move combined straw over onto land which has been plowed. It fastens to the rear of a plow and moves the straw from the strip which will be plowed the following round over onto that just plowed in the current round. Enough clods are moved to anchow the straw in place. It looks as though it would have possibilities in eastern South Dakota where weeds cause trouble on sub-surfaced land. We will have two of the attachments on districts in South Dakota this fall and will set up some field trials to check on erosion control and crop yields."

Bruno Klinger of Fort Collins, Colorado reports: "Range grasses remained partly green even during the drought period and toward the end of the month improved in appearance as a result of the two showers. Cattle gains in the contour furrowed pastures seemed to be about the same as those in the unfurrowed pastures. Gains in actual pounds will not be reported until next month, as the final figures for August are not yet at hand."

Ralph A. Cline of Bozeman, Montana reports: "All plots except those subsurface tilled were fallow cultivated for the third and last time. Stubble mulch plots this year have required only two operations to control weeds. This may be attributed to the fact that a treader was used in conjunction with the subsurface tillage implements. It has been observed that the treader plays an important part in weed control work, because the pronged wheels pulverize the lumps of soil in which weeds find moisture, tear loose the root systems, and expose them to the air.

"This fall wheat stem saw fly (Cephus cinctus Nort.) damage was detected for the first time on this study. The damage was light on the plots but rather severe on surrounding fields. Farmers, seeing the damage done to their fields, are becoming quite concerned over this pest. It is anticipated that in the near future various methods of control will be tried which may not be conducive to soil erosion control."

R. A. Norton of Ames, Iowa reports:

"Field tests of primary tillage practices for corn production

Marion and Mahaska Counties, Iowa, 1944

Location of plots and type of tillage	Plant heights in feet		Stand plants per 100 ft.	
	Not fertilized	5-10-5 fertilizer	Not fertilized	5-10-5 fertilizer
PLOWED PLOTS				
Eysink Farm	6.1	6.3	66	61
Van Gorp Farm	6.5	6.8	79	92
Av. farm in Pella Area	6.3	6.6	72	76
Dodds-Stevenson Farm	5.7	5.8	63	61
DISKED PLOTS				
Eysink Farm	5.9	6.3	65	61
Van Gorp Farm	6.2	6.7	71	79
Av. farm in Pella Area	6.0	6.5	68	70
Dodds-Stevenson Farm	4.0	4.5	65	62
SUBSURFACE TILLED PLOTS				
Eysink Farm	5.7	6.3	74	67
Van Gorp Farm	6.4	6.7	83	84
Av. farm in Pella Area	6.0	6.5	78	76
Dodds-Stevenson Farm	3.2	4.1	56	59
LISTED PLOTS				
Eysink Farm	5.3	5.8	65	62
Van Gorp Farm	5.7	6.2	70	58
Av. farm in Pella Area	5.5	6.0	68	60
Dodds-Stevenson Farm	4.1	5.7	64	64

"Note: Preliminary tabulation only. These data are not released for publication."

Hugh C. McKay of St. Anthony, Idaho reports: "An interesting feature showed up this year for the first time in the crop residue utilization, tillage trials during the summerfallow season. On plots that have had the stubble burned several times and tilled with the subsurface implements, there is a pronounced breakdown in the cloddiness of the surface soil. The plots look as though a fine dust mulch has been prepared

on the surface. On other plots where the stubble has been burned but plowed with the one way disc or moldboard plow no such breakdown in cloddiness has occurred.

"Evidently the heat from burning stubble must have some effect on the organic matter of the surface soil, and when the same surface soil is thus exposed to several burnings due to subsurface tillage the accumulative effect shows up much more rapidly. It doesn't seem possible that the heat from a stubble fire would heat the soil sufficiently on the surface to destroy any organic matter, but some change has definitely occurred which is shown by this year's plots.

"This may give a clue to the rapid loss of organic matter, 50 per cent after 35 years of farming, from the soils in this area. This may be another important argument against burning and should be given detailed study."

Carl L. Englehorn of Fargo, North Dakota reports: "Another implement which has met with considerable interest, especially in the sandy soil area at Upham, North Dakota, should be included in the tillage trials, perhaps on a field trial basis. This implement, developed by a farmer near Upham, is designed to be used behind a moldboard plow and poney press drill at spring seeding time. It removes straw and stubble from the unplowed portion of the field and deposits this residue over the plowed land. Unfortunately, field trials at Upham which included this implement were destroyed by hail.

"At Edgeley threshing of the tillage plots has been completed. Yields of wheat are included in the following tables. Variations in yield as between tillage methods were not great. Due to rains, threshing at Langdon was delayed.

"Yield of wheat, bushels per acre, Edgeley spring tillage plots, 1944

Tillage method	Yield, bushels per acre -			
	1	2	3	Average
Burn stubble, no tillage	21.7	17.3	29.3	22.8
Moldboard plow	17.5	29.8	32.7	26.7
Oneway disk	23.3	28.3	31.8	27.8
Field cultivator	27.0	24.8	29.8	27.2
Subsurface tiller	21.8	26.7	31.7	26.7

"Yield of wheat, bushels per acre, Edgeley summer fallow, 1944

Tillage method	Yield, bushels per acre -			
	1	2	3	Average
Two tons straw, subsurface tillage	33.3	31.8	29.8	31.7
Field cultivator	34.0	28.5	29.5	30.7
Subsurface tiller	30.8	29.5	31.7	30.7
Moldboard plow, pit	35.2	32.8	25.2	31.1
Moldboard plow	32.3	28.3	28.2	29.6

Joseph Belanger of Pendleton, Oregon reports: "Reports from county agents of yields on the field trials carried on last summer show the following results:

County	Ranch	Bushels wheat per acre -	
		Stubble mulch	Check field (Moldboard)
Sherman	Moore	36.4	31.0
Sherman	Cooper	20.8	24.3
Gilliam	Rice	26.9	21.6
Morrow	Anderson	21.3	20.4

DRAINAGE AND WATER CONTROL DIVISION

Hydrologic - Land Use Studies

North Appalachian Experimental Watershed at Coshocton, Ohio - L. L. Harrold reports: "In the month of August, 4.96" of rain fell causing six separate runoff periods.

"Of special interest is the fact that the rain of 1.33 of August 23 produced the highest rates of runoff yet recorded at this station. Maximum rates of rainfall listed below are of the order of 100-year recurrence.

Period	2 min.	5 min.	10 min.	15 min.	20 min.
Maximum rainfall rate in./hr.	11.10	7.98	6.36	5.48	4.20

The effect of land cover on single-crop and strip-cropped watersheds is apparent in the following table which gives the peak rate of flow and total runoff for the August 23 storm.

Storm of August 23, 1944

Watershed No.	Drainage area	Land use	Peak rate of flow	Total Runoff
	Acres		Inches per hour	Inches
106	1.56	Corn - straight row	7.63	0.94
121	1.42	Corn - contour	7.82	1.00
188	2.05	Corn - contour (disked)	3.06	.68
191	1.20	Corn - contour (disked)	3.40	.45
113	1.45	Wheat- improved	.03	.004
118	1.96	Wheat - prevailing	2.62	.59
111	1.18	Wheat-meadow strips	.15	.02
124	2.07	-do-	.07	.02
187	7.20	-do-	0	0
185	6.7	Meadow - 1st year	.03	.004
192	7.86	Meadow - 1st year	.01	.001
109	1.69	Meadow - 2nd year	0	0
115	1.61	-do-	0	0
123	1.37	-do-	0	0
130	1.63	Meadow - permanent	0	0
128	2.21	-do- (poor)	.09	.03
102	1.25	Pasture - prevailing	0	0
104	1.33	Pasture - improved	0	0
129	2.47	Pasture - improved	.54	.08
135	2.69	Pasture - prevailing	.17	.02
169	29.0	Mixed - strip cropped	1.48	.38

"It is pointed out that, of the corn areas 106, 121, and 188, the disked area 188 gave the least amount of runoff and the lowest peak rate. Records for the greatest storms in 1941 and 1943, when these watersheds were in comparable land cover, show that watershed 188 had more total runoff than watershed 106 and runoff peaks about the same as watershed 106. This fact appears to give added value to results this year when watershed 188 (disked - corn) had much less runoff amount and lower peaks than the plowed watersheds 106 and 121."

Central Great Plains Experimental Watershed at Hastings, Nebr. - I. W. Bauer reports: "Rainfall for the month of August at the Meteorological Station, was 7.72". A total of 10.35" was recorded at G35, and 9.80" at G42R, stations in the lower part of the area. This is the highest recorded in a month at this project. There was considerable runoff from the rains. Peaks at the gaging stations were as follows:

Station #3 - 86 cfs.
Station #5 -175 cfs.
Station #8 -373 cfs.
Station #11-380 cfs.

This is the highest peak on record for Station #11. Some of the small watersheds were washed quite badly.

"During the first part of the month the weather was dry and with the small amount of rain in July, some of the corn was hurt. Some of the farmers had quit plowing because the ground was too dry. The subtilled plots were too hard to work with the subtiller, so they were broken up with a Killefer chisel. This left them in shape to absorb considerable moisture when it did rain."

Hydrologic Studies - LaFayette, Indiana - R. B. Hickok reports: "The drought, beginning in June and worsening through July and the first half of August, was relieved by a good rain on the 16th, followed by two more good rains on the 27th and 31st. Total rainfall recorded for the month at the Throckmorton Farm was 2.18" and at the Dairy Experiment Farm was 3.38". The "normal" August rainfall for the vicinity is 3.44". Corn on the experimental watersheds and plots on the Throckmorton Farm came through the drought in fair condition and is benefiting from late rains.

"Supplementing the 1944 crop-yield data given in the previous month's report, the following summary and analyses shows highly significant effects of treatment on yield of hay and wheat.

Crop	Treatment	Av. Yield/A	Difference	Sig. Dif. (5%)	Highly Sig. Dif. (1%)
Hay	Conservation	3519 lbs.	1402 lbs.	613 lb.	827 lbs.
	Prevailing	2117 lbs.			
Wheat	Conser.	29.5 bu.	4 bu.	2.8 bu.	3.8 bu.
	Prevailing	24.5 bu.			

*See July report for specifications.

"The following table shows composition of wheat, grain, and straw from the conservation and prevailing practice watersheds and analyses showing significant differences in protein, phosphate and potash content of the grain resulting from different treatments. (Similar analyses of data on composition of straw was not afforded by composite samples taken.)"

Watershed No.	Practice	Percent					
		Protein		P_2O_5		K_2O	
		Grain	Straw	Grain	Straw	Grain	Straw
5	Prevailing	13.6	3.98	0.92	0.153	0.65	0.82
8	Prevailing	14.5	3.43	0.93	0.121	1.14	1.11
6	Improved	14.5	5.57	0.99	0.161	0.54	1.80
7	Improved	15.4	6.03	1.09	0.201	0.64	2.08
Increase of improved practice watersheds over prevailing practice watersheds		0.90	2.1	0.11	0.044	-.31	.98
Significant difference at 5% level		0.47%		0.05%		0.04%	
Significant difference at 1% level		0.52%		0.07%		0.05%	

Hydrologic Studies - East Lansing, Michigan - W. U. Garstka reports: "Rainfall was 2.90" at the cultivated watershed, 2.87" at the stubble mulch plots, and 3.28" at the wooded watershed, as measured in a standard gage. The average for East Lansing, based upon a 40-year record at the U. S. Weather Bureau, is 2.65" for the month of August. The first half of the period was exceptionally dry, only 0.04" of rain falling before August 14. Practically all of the precipitation fell in the last week of the month. Weather was exceptionally hot and dry, and considerable damage was reported to farm crops because of deficient moisture in the soil.

"Soil moisture at the cultivated watershed attained the lowest content of the year, the resistances in the surface horizons exceeding 100,000 ohms in the early part of the month. The soil has lost a greater part of its moisture content down to depth of 30". A number of rainfalls amounting to about 2" during the latter part of August served to replenish the moisture in a depth of only 12" of soil."

Hydrologic Studies - Ithaca, New York - B-2 - John Lamb, Jr. reports: "The only runoff from the watersheds was seepage from the 18-acre idle land watershed. Apparently, the cover of chiefly poverty grass and weeds uses less water by transpiration than the trees which leaves more water for seepage runoff.

"The total precipitation for the month was 2.07". The maximum temperature was 93°F and the minimum 45°F."

Hydrologic Studies - Cherokee, Oklahoma - B-2 - H. A. Daniel reports: "Moisture conditions at this station have been considerably above normal during July and August. A total of 10.2" of rainfall was received during this period. There were 14 rains but only 3 were of sufficient intensity to cause runoff from most of the experimental areas. The distribution of the rainfall has been very good and, consequently, there is plenty of soil moisture."

Microbiological Studies - Lincoln, Nebraska - F. L. Duley reports: "Nitrate determinations were made on oats land to be put to wheat this fall with different treatments. Further work has been done on the effect of rapidly decaying organic matter on the percolation rate of the soil."

Hydrologic and Microbiological Studies at College Park, Md. - H. W. Hobbs reports for July: "Land Use Studies - Rainfall deficiency continued throughout the period, making the third consecutive month where it has been more than 47 percent below normal. The 1.60" falling in July occurred on 7 days and was 59 percent below normal. The accumulated deficiency since January 1 is -19 percent. No runoff occurred on any of the drainage areas in July. The corn on W-I (strip cropped) and W-II (planted up and downhill) has not been greatly affected by the drought as yet, but there has been considerable damage from Japanese beetle infestation. The sorghum stand is thin in spots on W-V and W-X, but is coming along well in growth. Wheat was combined on July 8 and 10 and hay was harvested July 12 to 17 with the following yields:

AREA	LAND USE	WHEAT Bushels/Ac.	HAY Tons/Ac
W-I	Strip cropping (approximate contour)	21.0	.76
W-II	Up and downhill planting	24.8	.90
W-V	Approximate contour above diversion terrace	26.9	1.07

Two cuttings of herbage under the 4' x 4' pasture cages on W-VI and W-VII this year show some interesting trends compared with results in 1942 when both pastures were being compared under the same pasture practices. No yields were obtained in 1943, but pasture furrows on the contour with a 20-foot horizontal spacing were installed on W-VII in May of that year. The following table summarizes water losses and yields for early summer periods in 1942 and 1944:

Period	PERIOD Days (No.)	PERIOD Rain (in.)	W-VI PASTURE 3.53 Ac. Runoff Loss %	W-VI PASTURE 3.53 Ac. Av. Yield* Tons/Acre	W-VII PASTURE 3.52 Ac. Runoff Loss %	W-VII PASTURE 3.52 Ac. Average Yield* Tons/Acre
June 2- July 3, 1942	31	3.58	1.1	.136	1.2	.134
May 1943			No change	in practice	Contour	furrows plowed
May 18 - June 9, 1944	22	1.34	2.3	.071	0.9	.088
June 9 - July 10,1944	30	1.44	3.5	.047	1.1	.053

*Based on hay equivalent at 10 percent moisture.

There appears to be a 20 percent advantage in yield on the contour-furrowed pasture W-VII over the non-furrowed pasture W-VI, for the 52-day period May 18 to July 10, 1944, a period of subnormal rainfall. In the period June 2 to July 3, 1942, when rainfall was normal, the yields were practically equal under similar pasture treatment (usual practices.) The runoff was about the same from each area in 1942 (total) and the peak rates for the period varied from equal rates to 60 percent greater on W-VII. In 1944, however, the total runoff on the uncontrolled pasture (W-VI) was 3 times greater than that on the contour-furrowed pasture (W-VII). At the same time the peak rates of runoff were 3 to 5 times greater on the uncontrolled area.

"Microbiological Studies - There was only one runoff period on the crop residue plots during the month of July. This was produced by 0.97" of rain which fell during the night of July 19-20. Runoff losses were very small and differences due to plot treatment were not apparent. Soil-moisture values for the month were slightly higher under the mulched plots than under the plots where the residues (wheat straw and lespedeza) were disked in or plowed under."

Runoff Studies

Runoff Studies at Danville and Blacksburg, Va. - T. W. Edminster* reports 1.6, 2.3, and 1.7" of rainfall for the month on the three watersheds near Chatham, Va. The total rainfall of 1.1" at Blacksburg was less than 1/3 of normal. There were no storms of outstanding intensity and subsequently little runoff.

Data recorded during the month at Blacksburg show the following differences between air and soil temperature:

Exposure	Max.	Min.	Av. Max.	Av. Min.	Mean Monthly
Air	97°	47°	85°	60°	73°
Soil six inch depth under mixed grass sod	87	80	80	70	75

The maxima of soil temperatures occurred about 4:30 p. m. while the minima were recorded at about 8:00 a. m.

*Mr. Edminster replaced Mr. Geo. A. Crabb who accepted a commission in the Navy on August 23.

Runoff Studies at Americus and Watkinsville, Ga. - In a Special Report to Operations for 1943, Mr. Carreker reports the following:

"Differences in rates of runoff as affected by moisture content of the soil are illustrated by the June 7 and June 10 storms, respectively. After oat harvest, with a ground cover of oats combine stubble mulch, a rain of 1.76"

volume and 3.68" per hour maximum 15-minute rate on dry ground June 7 caused runoff with a maximum rate of 11.31 cfs and 0.59 cfs. per acre giving a 15-minute coefficient of runoff "C" of 0.16. The ground was again wet on June 9. Then on June 10, with the same ground conditions as on June 7 except for greater moisture content (resulting from the June 7 rainfall and about 0.5" on the 9th), a rain of 1.23" volume and 2.96" per hour maximum 15-minute rate caused runoff with a peak rate of 23.9 cfs. and 1.24 cfs. per acre giving a coefficient of runoff "C" of 0.42.

"Cowpeas were planted and the field plowed 4" deep with a disk tiller on June 22. A rain of 1.70" volume and 2.40" per hour peak rate June 27-28 produced only a slight trace of runoff, showing the ability of loose ground to take up water when the rainfall rates are not too high.

"Several subsequent showers had partly settled the ground when an intense shower of 0.82" volume and 2.88" per hour maximum 15-minute rate occurred July 7. A peak rate of runoff of 17.2 cfs and 0.89 cfs per acre occurred producing a coefficient of runoff "C" of 0.31.

"Additional showers further settled and wet the ground and on July 13 a rain of 1.73" with a maximum 15-minute rate of 2.64" per hour caused runoff with a maximum rate of 19.4 cfs and 1.01 cfs per acre resulting in a coefficient of runoff "C" of 0.38. It is interesting to note that the maximum rainfall rates ranging up to 3.80" per hour and occurring just prior and subsequent to 9:40 p. m. produced a maximum runoff rate of 1.00 inch per hour. Whereas approximately 40 minutes later with maximum rainfall rates of only 1.68" per hour but falling on saturated soil maximum runoff rate was still 0.98" per hour. This illustrates again the relation of rainfall and runoff under saturated ground conditions.

"The ground had dried out considerably by July 27 when there occurred a rain of 1.55" with a maximum 15-minute rate of 2.62" per hour. The runoff from this rain amounted to 15.2 cfs and 0.79 cfs per acre to produce a coefficient of runoff "C" of 0.30. The cowpeas were only 8" high at the time of this rain and had little effect on the runoff."

The above data were obtained from one of the watersheds near Watkinsville.

Runoff Studies at Bentonville, Ark., and Muskogee, Okla. - V. D. Young reports heavy precipitation 6.56" at Bentonville where the Weather Bureau normal for August is 4.06. The August 13 rain produced a peak rate of runoff of 2.2 cfs per acre from the 10-acre cultivated area, 0.8 from a 19.5-acre strip-cropped area, and 0.2 cfs per acre from a 10.75-acre terraced area. No runoff at all was recorded on the two grassed and one wooded watersheds. Without information on vegetal cover and tillage and on rates of rainfall no definite quantitative conclusions can be drawn. However, the effect of cover where the soil is deep and permeable is unmistakable. The above should be compared with statement in the synopsis of the Preliminary Report for the Claypan Prairies regarding the relatively small differences in rates of runoff from grassed and cultivated watersheds in the Claypan Prairies where the soils are shallow and highly impervious.

Runoff Studies at Albuquerque and Santa Fe, N. M.; and Safford, Ariz. - J. H. Dorroh, Jr., reports unusually heavy precipitation on the Albuquerque and Santa Fe watersheds during July and August. One of the raingages on the Santa Fe watersheds recorded a total of 8.4" between July 3 and August 25 which is nearly 60 percent of the mean annual. On July 4 a rain of 1.11", of which 0.97" fell in 30 minutes (average 30-minute intensity of about 2" per hour) and 0.61" in 15 minutes (average 15-minute intensity of about 2.4" per hour) resulted in a peak rate of runoff of 117 cfs from the 790-acre grassed watershed. On August 18 a similar peak, 122 cfs, was produced by a rain of 1.66" with similar 15 and 30-minute intensities and with 1.41" falling in 45 minutes, an average rate of nearly 2" per hour for 45 minutes. These peak rates of runoff (117 and 122 cfs) are quite small. They are, however, highly significant, being far in excess of the highest rate peak of 9.66 cfs thus far recorded in six years on this watershed. It is also significant that in the 36 years during which rainfall intensities have been recorded in Santa Fe the 30-minute intensities of the July 4 and August 18 storms were exceeded only twice. This record reported by Mr. Dorroh will prove of great value in connection with the Preliminary Report on the Hydrologic Design of Small Reservoirs and other Conservation Structures in areas represented by the runoff studies and other hydrologic work in Region 6.

Mr. Dorroh also reports progress in the collection and compilation of records of intense rainfall and of floods in New Mexico, Colorado, Arizona, and Utah. This work is being done in connection with the preparation of the Hydrologic Section of the Regional Engineering Handbook. In view of the importance of information on peak rates and of total amounts of runoff in the work of the Service in Region 6 the Regional Office issued a memorandum to District Conservationists requiring them to submit information concerning significant storms occurring in their vicinity.

Runoff Studies at Edwardsville, Ill., and Fennimore, Wisc. - N. E. Minshall at Madison, Wisc., reports normal precipitation at Edwardsville and above normal at Fennimore. Mr. Krimgold reports the completion of the manuscript entitled "Preliminary Report for the Hydrologic Design of Small Reservoirs and other Hydrologic Structures in the Claypan Prairies" by D. B. Krimgold and N. E. Minshall. The information contained in this report was derived largely from the runoff studies at Edwardsville, Ill., Muskogee, Oklahoma, and McCredie, Mo. It is planned to make it available to technicians of the Service and to other interested parties in the form of a processed publication of the TP series. The following excerpts from the synopsis of the report give a fair idea of its contents:

"This report consists of two parts, one (Part I) dealing with the hydrologic design of small reservoirs and another (Part II) in which are given peak rates of runoff for use in the design of conservation structures on small agricultural areas.

"The principles involved in the hydrologic design of small reservoirs are discussed briefly. Quantitative relationships are presented in the form of equations and formulas. Values of Evaporation minus Precipitation "E - P" and of Surface runoff "R" for use in the hydrologic design of small reservoirs in the Claypan Prairies of Illinois, Indiana, Iowa, Missouri, Kansas, and Oklahoma are given in tables 1 and 2. The extent of the areas of application of the three zones in which the several values of "E - P" and "R" are to be used as well as factors to be applied to the

basic peak rates of runoff are shown on a map (fig. 1). Figures 2, 3, and 4 show the relationship between drainage area and mean surface area (of the reservoir) which must exist for reservoirs 6, 8, 10, 12, and 15 feet deep in order to provide dependable supplies of 6, 12, and 24-acre inches per annum in Zones 1, 2, and 3. The use of the basic data and the curves in solving practical problems is illustrated in numerical examples. Samples of computations made in developing the curves are included to show how curves for reservoir depths and required amounts of water, other than those covered in this report, can be prepared.

. . ."The results of the analysis presented in this report indicate that dependable supplies of water sufficient for livestock and other uses on the farm including supplementary irrigation can be readily secured by means of reservoirs of resonable depth on relatively small drainage areas (less than 100 acres). The results also show rather small differences in probable peak rates of runoff from small watersheds (up to 300 acres) in pasture and in cultivation. This is no doubt due to the very limited capacity of the soil to absorb and retain rainfall."

Runoff Studies at Colorado Springs, Colo. - H. K. Rouse reports an intense rain in August with rates for 15 and 30 minutes reaching values given in Misc. Pub. #204 (Yarnell) for a 2-year recurrence interval. A peak rate of runoff of about 1.75 cfs per acre was recorded on the 10-acre cultivated area. This was the second highest peak in seven years of record. Runoff from the three larger grassed watersheds was light.

"The manuscript of a "Preliminary Report on the Hydrologic Design of Small Reservoirs and other Conservation Structures and Practices in the Western High Plains", by D. B. Krimgold of the Washington office, and H. K. Rouse, has been completed and is now in process of duplication for submission to the several interested Directors of State Experiment Stations and Regional Offices prior to publication."

Hydraulic Studies

Hydraulic Studies at the St. Anthony Falls Hydraulic Laboratory, Minneapolis, Minn. - F. W. Blaisdell reports: "The 1/4-scale model of the McCredie, Missouri, drop-inlet culvert was completed on August 7. Testing was begun on the 12th, and the tests were completed on the 25th. The 1/4-scale model was then dismantled and the construction of a full-scale section of the riser 4 feet long was begun. The crest templets remain to be sent, the crest poured and shaped, and the dam fill simulated before testing can be resumed.

"The tests to date have shown that there is a double rating curve for the McCredie drop-inlet culvert. This is due to the flow conditions in the riser. One rating curve applies for heads from zero to 4 feet; for heads from zero to 0.49 feet, the nappe may be either aerated or non-aerated, while above a head of 0.49 feet, the nappe is aerated and the entrance to the riser acts as an orifice and eventually controls the discharge, the riser and barrel flowing only partly full of water. At a head of 0.5 feet the difference in discharge between the two curves is 0.5 cfs or 5 percent. At a head of 3 feet the difference is 112 cfs or 175 percent of the lesser discharge.

"The need for additional information was further emphasized when Mr. Culp, Engineer of the Regional Office, called at our project on August 26 with a design for a drop-inlet culvert to carry a flow of 1200 cfs and to cost about $35,000. He was desirous of determining if this structure would flow full and carry its design discharge. We were not in a position to give him a definite answer, although we made available our test results to date and the design is based on these results.

"On August 3 a report entitled 'Report on Tests made on Three Types of Flume Entrance' was submitted."

Hydraulic Studies at Stillwater, Oklahoma - V. J. Palmer reports: "The construction of experimental equipment incident to testing vegetal-lined channels in September was the main effort during this period.

"The working plans for the Stillwater Hydraulic Laboratory have received the approval of the Washington office. The manuscript containing the Spartanburg vegetal-channel data was sent to Dr. Nichols for review."

Hydraulic Studies at Logan, Utah - C. W. Lauritzen reports: "A clay soil was substituted for the silt loam employed in this investigation until recently. While a calibration curve has not yet been developed for the clay, the data seems to indicate that the same general relationship holds with the clay as for the silt loam.

"Measurements of permeability, erosivity, and shrinkage were continued. The testing of devices for estimating seepage losses was continued. Field investigation of seepage losses in canals has been continued.

"The Board of Directors of the West Cache Irrigation Company after reviewing the report of a preliminary investigation invited the Soil Conservation Service to investigate the problems of one slide area with special reference to the feasibility of reducing seepage and stabilizing the slip through lining with low-cost material and compacting the bed and bank of the canal. The Board seeks from the Utah Agricultural Experiment Station and Soil Conservation Service technical assistance and the loan of heavy equipment and agrees to pay for operating the equipment and other costs incidental to lining. The preliminary investigation of seepage losses and other factors on the Paradise canal has been completed and the report is in preparation. Excessive seepage losses were measured in certain sections.

"Recently the Utah State Department of Publicity and Industrial Development has become interested in the measurement of seepage losses and the investigation of low-cost linings for canals. It is understood that a substantial State fund has been made available for this work. The services of a consulting engineering firm of Ogden, Utah, have been employed and they have begun to make some measurements in cooperation with the Utah Agricultural Experiment Station with this project cooperating."

Hydraulic Studies at McCredie, Missouri - B-2 - D. D. Smith reports: "Calculations of retardance for the four different grass varieties at three years of age have been completed. In general they agreed quite well with the results from the 2-year-old grasses. The installations are practically complete for performance of the cross-section experiment.

"Mr. Zingg has extended his analysis of the effect of detention reservoir-type stock ponds on runoff crests from a one-square mile to a 50-square mile drainage network basis. Work is continuing on evaluation of small upland reservoirs for flood-control purposes."

Hydraulic Studies at Corvallis, Oregon - A. W. Marsh reports: "Headquarters were transferred back to Corvallis on August 29. Prior to that, single-furrow irrigation and infiltration experiments were run in the stubble of the harvested barley plots. Interesting results were obtained which will be presented later.

"Partial calculations and tabulation of data have been made from the past season's irrigations. In general, trends shown by last year's results have largely been substantiated. Below is shown a tabulation in order of the infiltration rate and percent runoff. The first three treatments stand out distinctly in both cases."

Rate of Infiltration		Percent Runoff	
Treatment	in/hr.	Treatment	%
Green manure plus manure	.114	6 hour irrigation	30.8
6 hour irrigation	.111	Green manure plus manure	32.2
12 hour "	.105	12 hour irrigation	32.5
4000# Gypsum	.071	20 T manure plus	
24 hour irrigation	.070	4000# Sulfur	53.0
20 T manure plus		4000# Gypsum	54.2
4000# Sulfur	.070	24 hour irrigation	54.3
48 hour irrigation		48 hour "	
(check plots)	.063	(check plots)	58.9
6000# Sulfur	.059	6000# Sulfur	63.0

The above table was taken from Mr. Marsh's report:

Hydraulic Studies at Prosser, Washington - Stephen J. Mech reports: "The alfalfa plots were mowed a few days after the irrigation on August 10-11-12. It is expected that two more irrigations will be required this season.

"Corn received its last irrigation of the season on August 22-23-24. Data from this irrigation will furnish interesting comparison with that from the July 27-29 irrigation which was preceded by cultivation and hilling. The plots were not disturbed in any way between these two irrigations.

"A casual observation of the application rates for the two irrigations shows, as might well have been expected, that during the irrigation immediately following the cultivation the infiltration rate was higher than that during the irrigation following. It seems that even after the channels in the furrows were scoured out, the infiltration during the irrigation immediately following the cultivation was higher than that during the irrigation which did not receive the benefit of cultivation.

"The soil loss on the other hand was lower during the last irrigation.

"It is of interest to note that whereas the infiltration rate on the corn plots was decreased by the absence of any soil disturbance, that on the alfalfa plots was increased by the absence of similar disturbance by irrigating in the furrows without reditching them. It is indeed intriguing that the same treatment should have such opposite influence on the two crops."

Hydraulic Studies at the California Institute of Technology, Pasadena, California - Vito A. Vanoni reports: "Report TR-74-CF-R1 by Hans Albert Einstein and Dell G. Shockley, entitled, 'Hydraulic Model Tests of Bianchi Bench Pipe Line Energy Dissipator" was reproduced and distributed. The pipe outlet developed in this study is made up of a cross pipe placed at right angles to the pipe line. Elbows welded at each end of this cross pipe, cause the water to discharge in the direction of the pipe line. Distribution of this report was limited because only a few copies were made. Some extra copies are available for loan to anyone interested.

"On August 8 and 9 a meeting of the SCS engineers in Southern California was held at the California Institute of Technology. The staff of the research project participated in the meetings, which included discussions of terracing, runoff disposal, irrigation and drainage, and stream control. Talks were given by members of the staff and the laboratory was shown to the group, which included about 30 people.

"Tests were completed to develop a type of flow meter which can be mounted on an alfalfa valve without removing the valve lid. This makes it possible to operate the meter at any desired valve setting and makes it much more useful than the first model that was developed. In the first model it was necessary to remove the valve lid entirely before the meter could be installed. Progress was made on preparing the report on this development."

Sedimentation Studies

C. B. Brown reports: "A report entitled 'Rates of Sediment Production in Southwestern United States' has been completed and approved for reproduction in multilith form for field distribution. This report contains a summary of 80 sediment records from the region embracing the Great Basin interior drainage, and the Colorado, Gila, Rio Grande and Pecos River watersheds. The records are based on suspended-load measurements and reservoir-sedimentation surveys, and cover periods ranging in length from 1 to 50 years. The summary table gives (1) the drainage basin, stream and point of measurement, (2) the drainage area in square miles, (3) the period and length of record, (4) the average annual runoff (total and per square

mile) during the period,(5) the average annual sediment load or sedimentation during the period,(6) the sediment concentration in runoff in percent, (7) the average annual sediment production per square mile, and (8) the estimated long-term average annual sediment production per square mile. The estimated long-term rates are based on analysis of discharge records or systematic bias in measurements and several other factors. The watershed areas range in size from 0.25 to 137,800 square miles. The estimated long-term sediment production rates range from 90 tons per square mile to 5,000 tons per square mile. The recorded average sediment concentration in runoff ranges from 0.002 to 13.69 percent (the latter on the Rio Puerco, N. M.). Although the data are not sufficient to develop curves correlating sediment-production rates with runoff or physical land characteristics in this highly varied region, they do offer a basis for more satisfactory estimation of sedimentation effects on irrigation, flood control, water conservation and similar structures than has been heretofore available.

"S. B. Detwiler and L. C. Gottschalk visited Hunting Creek on the Potomac below Alexandria, Va., to study the effects of different types of plants on the deposition of sediment under tidal conditions. A number of plants were collected and used in trial plantings for a sediment-control vegetative barrier at the head of Loch Raven Reservoir at Baltimore, Md. Plants selected included white and black willow, wild yellow iris, alder, mallon, red maple, wild rice, pickeral weed and 3 species of Sagittaria. Forsythia, found in the vicinity of the reservoir, was also used in the trial plantings.

"At the request of a field representative of the Maryland State Fair Board, L. C. Gottschalk visited Harford County, Md., to inspect areas of deposition of eroded material from farm land. An interesting side light of this trip was a visit to Bush River on the Chesapeake which at one time was navigable as far up as Harford-on-the-Bush, a small colonial settlement distinguished as being the site of the first meeting for the Declaration of Independence. The ruins of an old mill still exist a hundred yards below the townsite. According to the present owner, an octogenarian descendent of the original owner, ships engaged in foreign trade sailed to this mill to obtain flour for European markets. Near the mill site was found an upright stone similar to those at other abandoned Colonial ports in this region, presumably used for mooring vessels. Several miles of land - the deposited soil of hundreds of Maryland farms - now separate this stone and the mill site from navigable waters."

Sediment Studies at the California Institute of Technology, Pasadena, California - Vito A. Vanoni reports: "Studies of the sediment problem at Escondido Creek in San Diego County were continued. The site was visited and some information regarding the amount of flow and the past behavior of the stream was collected. Based on this evidence it will be possible to decide if a program of self-cleaning can be applied to the channel or if actual dredging and major improvements of the channel will be necessary. It appears that the sand now clogging the channel can be used by the local sand company, thus reducing the cost of any excavation.

"The analysis of the density current data collected at Shaver Lake this summer was continued. Some additional information on inflow to the lake was received from the Southern California Edison Company and was incorporated into the data. Some laboratory work was done in connection with the development of techniques for studying entrance mixing experimentally.

"Progress was made on the installation of an apparatus for studying various methods of bank revetment. The apparatus is installed in the 8-ft. outdoor model basin and consists mainly of a wooden approach channel discharging on a sand bed. The sand bed, which is about 30 ft. in length makes up the experimental section, where revetments of various kinds will be studied. The objective of the studies is to compare various types of revetment with a view to determining their relative effectiveness.

"On August 8 and 9 a meeting of the SCS engineers in Southern California was held at the California Institute of Technology. The staff of the research project participated in the meetings, which included discussions of terracing, runoff disposal, irrigation and drainage, and stream control. Talks were given by members of the staff and the laboratory was shown to the group, which included about 30 people.

"Mr. H. S. Bell of the Laboratory staff attended and participated in the Pacific Southwest conference which was held at the Huntington Library in Pasadena. The general subject discussed at this meeting was the relation between man and nature with special reference to the effects on the land resulting from man's occupation. Soil conservation is one of the important factors involved in such a discussion and our representative was able to contribute considerably to the meeting."

Drainage Studies

Everglades Experiment Station at Belle Glade, Fla. - C. Kay Davis reports: "Final inspection was made during the month of August in connection with the project on Soil Capability Survey of Florida Everglades Area, and the soil capability table is now being prepared for State approval. We are having to work out a capability table for Collier County so that all of the soils in the Everglades Drainage District will be represented by the same symbols, and this is now being done."

Purdue Muck Crops Farm, North Liberty, Indiana - R. E. Morris reports: "For the first time since the first week in June appreciable rains fell in this area. They were as follows: August 22, 0.2"; August 27, 0.9"; August 29, 0.9", and the total 2.0".

"At this time significant differences are beginning to become evident among the crops on the drainage plots. No harvesting has been done as yet, but two things are easily discernible:

1. Mint growth is greater on the plots with high water tables. There is little difference between the 15" and 30" plots but the growth on the 45" plots is noticeably less.

2. Sweet corn growth is exactly opposite to that of the mint as far as depth of water table is concerned. The corn is taller and has good color on the 45" plots, looks almost as good on the 30" plots, and is much poorer in appearance on the 15" plots.

"About the middle of the month some data were taken for the purpose of studying the behavior of ground water in this kind of muck. A number of borings were made in each of four plots and levels were run over the water surfaces. There had been no rain prior to that time and the ditches had not been changed so the results obtained are representative of the condition that has existed most of the summer. The data gathered are plotted on drawings and copies will be gladly furnished to those who are interested in the material.

"A small amount of construction work was done during the month. One drop inlet culvert was built as a control structure and two corner observation wells were built. The new wells were made from 2" pipe and place no obstruction in the cultivated portion of the plots."

Drainage Investigations at St. Paul, Minn. - D. G. Miller reports: "The time of Mr. Wiberg and myself has been mostly spent collecting the experimental drain tile and cylinders that are due to be tested this year. We have already dug up 5 series of experimental concrete drain tile that we installed 19 and 21 years ago in mineral soil here at University Farm and in a low acid peat at Coon Creek some 25 miles north of here. We have completed the breaking tests of these tile and the results are not particularly encouraging as regards permanence of concrete tile in peat. The peat/mineral soil strength ratios of these 5 series of tile were 53, 67, 68, and 72. In one of these series five different curing conditions were introduced, none of which markedly raised the resistance. We still have one other lot of 6-inch tile to test in which curing conditions were varied in conjunction with the use of calcium chloride and an iron compound. These tile have been installed 12 years in mineral soil here at University Farm and in a high acid peat near Madison, Wisconsin. Six variables are included in this series and the tile when installed had average breaking strengths ranging between 1880 and 1980 and average boiling absorptions that ranged between 7.0 and 8.2 percent. These tile when installed were the best of any of the groups and were 200 pounds stronger and 1 percent lower in absorption than A.S.T.M. requirements for "Extra Quality" and we are awaiting with great interest results of these 12-year tests. I am sorry these tests have not run around 20 years as have those of the other tile as the tests generally show that strength losses of any but the poorest of tile do not become marked until they have been exposed in peat for about 20 years. We will have more to say along this line when all our tests are completed but, up to the present, it looks as though it will require concrete drain tile of extremely high quality to insure satisfactory service much beyond about 30 years in even relatively low acid peats. Along with all these drain tile, it is certainly fortunate that we will have tests of the many cylinders upon which to rely for our final conclusions."

The Everglades Project at Ft. Lauderdale, Fla. - C. Kay Davis reports: In connection with the project on Topographic Survey of Everglades Region "we have confined our work during the past month to the area south of the Tamiami Trail. Getting anything done in the field at this time is quite difficult. We cannot travel in the area south of the Palm Beach-Broward County Line at this time of the year, and, with the exception of a few ties here and there, we do not contemplate any further level work in Palm Beach County south of Lake Okeechobee. The principal difficulty, however, is getting a field partyorganized to do anything. A field party of less than 3 men cannot make much progress, and many times we waste considerable time trying to find the third man to make up the party.

"Records from the six aerial gages are being recorded semi-monthly in accordance with the procedure outlined for the project on Study of Water Table Conditions in Remote Areas of the Everglades."

IRRIGATION DIVISION

Drainage of Irrigated Land

Big Horn Drainage Basin, Wyoming - J. S. James, recently assigned to initiate studies, in cooperation with the Wyoming Agricultural Experiment Station, of drainage and other problems relating to irrigation practices in the vicinity of Worland, Wyoming, reports: "The work in Worland has consisted essentially of obtaining a general familiarity with the Big Horn drainage basin and the use of water, with attendant problems, in this area. Lack of transportation has limited this work, in large part, to the immediate vicinity of Worland where some personal inspections could be made and information obtained with and through personnel of the Work Unit engaged here in cooperation with the Washakie Soil Conservation District. A general reconnaissance was made of the Lower Big Horn Valley, in Wyoming, and the Shoshone River area, including the Heart Mountain Division of the Shoshone Project, which project has been the subject of a report to the War Food Administration, in regard to the war-time value.

Imperial Valley, Calif. - Vladimir S. Aronovici and William W. Donnan, El Centro, Calif., report that work of preparation of a progress report was continued throughout the month, and the main sections were completed in rough draft. Diagrams were developed for presentation in the report. * * * At a Soil Conservation Service engineering conference at the California Institute of Technology at Pasadena, Mr. Donnan presented a paper prepared by himself and Mr. Aronovici on "The Principles of Drainage," dealing with the techniques of drainage investigations. Emphasis was put on the development of information on the over-all problem area before entering into a detailed investigation of the site conditions. * * * Permeability measurement of uniform sand sizes used in the sump study were made and it was observed that the permeability coefficients of material held on 30-mesh and passing 20-mesh were above 600 cc/cm/hr, which is greatly in excess of any aquifer material of the valley. This indicates that even material held on 100-mesh and passing 50-mesh would have sufficiently high permeability values to make their use highly practical for filters in sumps. * * * Moisture tension observations are continuing on a set of samples placed dry on the tension table. The first tension applied was 60 cm. This study is for the purpose of observing the rate of water exchange from a wet zone in the profile (capillary fringe) to the surface where the soil is dry. It has taken more than a month to bring these samples to equilibrium moisture. Great difficulty has been encountered with large temperature fluctuation.

Storage of Water Underground for Irrigation

San Joaquin Valley, Calif. - Dean C. Muckel, Pomona, Calif., reports: "A review of percolation data collected up to August 1 for all ponds in operation showed a continued decrease with continued application of water. A conference was held with Dr. Magistad and Dr. Christiansen of the U. S. Salinity Laboratory in Riverside, regarding the results being obtained on percolation rate changes in core samples and to learn if the laboratory tests had indicated some special treatment to be tried under field conditions. * * * A recent report on the 'Ground-Water Features

of the San Joaquin Valley, California' dealing with the possibility of recharging the ground-water supply by spreading or by over-irrigating with Central Valley imported water, was read and discussed with representatives of the Bureau of Reclamation. * * * Work has progressed on a group of 16 ponds near Wasco and these are now almost ready for operation. They will be supplied from a well and can be run throughout the nonirrigating season.

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Arthur A. Young, Pomona, Calif, reports: "Office studies of permeabilities of soil were continued at the Salinity Laboratory at Riverside with approximately 30 cores. Nothing new has developed during the month in regard to findings but continued records present a better picture of what is happening in the soil. Permeability charts have been prepared showing results in all cores. New cores have been obtained in transparent lucite cylinders at two spreading grounds in Los Angeles County."

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Fred C. Scobey, Berkeley, Calif., reports: "With the platting of the July records of ponds in Kern and Tulare counties, California, it was noticed that a definite trend of performance was characteristic of many of the ponds, both in the decrease of rate of percolation and in the increase in rate of percolation for the fewer cases where this took place. As a background toward a mathematical analysis of this phenomenon, hitherto unnoticed, considerable research in literature was made during the month. It is not implied that decrease in rate has not been understood to be characteristic of the percolation -- infiltration -- of water in observation ponds. The unnoticed part has been the peculiar mathematical rate that becomes typical of many ponds under apparently diverse conditions."

Evaporation, Transpiration and Seepage Losses Affecting Irrigation Practices

Santa Ana Canyon Water-Supply Study. (Orange and Riverside Counties, Calif.) - Dean C. Muckel reports: "Field work of mapping and classifying all lands in the Santa Ana River area according to their water requirement was completed during the month. Work is now under way to transfer the information from field sheets to a base map. Information on extent and location of lands being irrigated from two canals which divert all surface water from the study area was collected from the Canal Companies. Other information on wells and available maps was obtained from the Orange County Flood Control District."

Water Conservation. (War Food Administration)

Harry F. Blaney, Los Angeles, Calif., reports: "I spent most of the month investigating irrigation projects in California for the War Food Administration. Following a trip to Berkeley and Sacramento to confer with Government and local officials, an inspection was made of Friant Dam and Madera Canal, Central Valley Project, also the areas being irrigated by storage water from Friant Reservoir. After analyzing all available data, a report was prepared on the benefits from a war-food standpoint that would be derived if the War Food Administration authorized the construction of the spillway drum gates on Friant Dam, as requested by the Bureau of Reclamation. Increased food production in 1945 and 1946 resulting from installation of the drum gates was estimated.

"An investigation was made of the Coachela Branch of the All-American Canal Project and a confidential report prepared. Attended a hearing called in Washington, D. C., to consider the issuance of a stop order on this project as a war-food project, owing to man-power shortage."

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James C. Marr, Boise, Idaho, reports: "A week was spent in company with Mr. Don Williams, Chief, Water Conservation Division, Soil Conservation Service, of Portland, Oregon, on examination of the Bureau of Reclamation Cascade Reservoir Project and on the preparation of a report thereon for the War Food Administration."

Irrigation Practices as They Affect Water Supplies

Harry F. Blaney reports: "Attended a meeting at Pasadena of Research and Operations personnel of the SCS in southern California, and presented a paper on 'Irrigation Requirements and Schedules,' with particular reference to the need for irrigation studies in Soil Conservation Districts before an operation irrigation program is recommended. * * * Conferred with zone technicians on irrigation program in Yucaipa and San Gorgonio Soil Conservation Districts."

Customs, Regulations and Laws Affecting Farm Irrigation and Drainage

Hawaii Water Law Report - Wells A. Hutchins, Berkeley, Calif., reports: "The final draft of this report was completed and sent to Washington for departmental approval before being submitted to the Honolulu Board of Water Supply."

Central Valley Project Studies - Mr. Hutchins reports: "A report on Problem 16 (Water-Prices), prepared by the problem leader, was received and carefully studied. I did not approve the report, but refused to sign it and notified the problem leader to this effect, giving my reasons. * * * A report on Problem 19 (Acreage Limitation), prepared by the problem leader, was received, and some time was devoted to its study. The committee is to meet in September to take action on this report."

Pumping for Irrigation

Loss of Head Through Check Valve and Gate Valve - Carl Rohwer, Fort Collins, Colorado, reports: "The installation of equipment for testing the loss of head through a 12-inch check valve at the Bellvue laboratory was completed and tests were made on the valve for discharges ranging from 100 to 3,000 gallons per minute. The results of these tests have been plotted together with those for the 6-, 8-, and 10-inch check valves which were obtained last year. From this plot the loss in head for each valve for specific discharges, depending on the size of the valve, will be determined. After completing the tests on the 12-inch check valve, a 12-inch gate valve was installed in the pipe line and the loss of head through this valve was determined for various discharges for 1/4, 1/2, 3/4 and full opening. A preliminary plot of these data has been made on logarithmic paper. For each opening the data plot on a straight line. The results are very consistent. An 8-inch gate valve is now being installed at the Bellvue laboratory for tests to determine the loss of head at various gate openings and discharges. Similar tests are planned for 4-inch and 6-inch gate valves.

Lining of Irrigation Canals and Ditches

O. W. Israelsen, Logan, Utah, reports: "Conditions at West Cache Canal Slide Area No. 2 about three miles southwest of Preston, Idaho, were examined by the Board of Directors of the company. The Board examined the records of canal-bank settlement as measured with an engineer's level, and also profiles showing the depth and slope of ground water at right angles to the canal. After considerable discussion, the Board decided to invite the Experiment Station and Soil Conservation Service to conduct detailed studies on this section of the canal at the earliest date practical. * * * I made preliminary inspection of the Bingham Levee, West Cache Canal, near Trenton, Utah, which ranges in height from 5 to 15 feet or more, and is nearly one mile long. The canal probably sustains excessive seepage losses. * * * Special attention has been devoted to improvement of the variable-head permeameter for use in field studies and also in the laboratory. Special attention has been given to measurement of the temperature of the water within the permeameter. Temperature variations in field measurements have shown noteworthy influence on the permeability."

Utah Irrigation-Company Water Supply, Storage and Conveyance Facilities

O. W. Israelsen reports: "J. Howard Maughan and G. P. South conferred with officials of the Office of Operations, Soil Conservation Service; Bureau of Reclamation; U. S. Geological Survey; State Engineer; and others in Salt Lake City concerning the proposed irrigation schedule to be used in these surveys. A second draft of the proposed schedule has been completed."

Control of Silting in Irrigation and Drainage Systems. (Texas)

Dean W. Bloodgood, Austin, Texas, reports that until the last week of August, the weather in Texas continued hot and dry. Consequently there was little stream flow and very little silt. Water samples from some streams contained decomposed algae and no silt. However, by the end of the month some of the streams were in flood stage and the waters contained large amounts of silt. "This was particularly noticeable for the Pedernales River, a tributary of the Colorado River, where the flood stage was the highest for many years and reached the near high of all records. The gage height at our Johnson City silt station was 27 feet, and the water splashed over the highway bridge. * * * While in the Pecos Valley on September 2, a visit was made to the Red Bluff Dam. The water behind the dam was low and many silt deposits were exposed. The capacity of the reservoir at the present gage is small and a large portion of the area contains all of the silt that was deposited before and after the first fillage of the reservoir in 1936. Since 1936 there have been a number of floods sufficient to have filled the reservoir several times. Probably more than 1,000,000 acre-feet of water has passed the dam, over the spillway and through outlet gates. The floods since 1936 no doubt have caused considerable silt deposition, as practically no silt passes the dam.

Evaporation from Water Surfaces, Texas

Dean W. Bloodgood reports: "At Buchanan Dam during July the evaporation losses from the Weather Bureau Type A pan was 11.90 inches; the Bureau of Plant Industry pan, 9.55 inches; and the Division of Irrigation screened pan, 8.70 inches. The precipitation amounted to 0.19 inch; the average wind velocity 13.64 miles per hour; the maximum daily temperature ranged from 82 to 106 degrees; and the daily minimum temperature ranged from 68 to 78 degrees. At the Mansfield Dam (Marshall Ford) Texas, the evaporation losses for July from a Weather Bureau Type A pan was 10.38 inches (11.90 at Buchanan) and from a Division of Irrigation screened pan, 7.89 inches, as compared to 8.70 inches at Buchanan Dam. The precipitation amounted to 0.10 inch, the maximum daily temperature ranged from 92 to 108 degrees and the minimum daily temperature ranged from 65 to 78 degrees."

Consumptive Use of Water Studies, Kootenai Experiment Station, and Gray's Lake, Idaho

Wayne D. Criddle reports: "Compilation of data on consumptive use of water in the tanks for the 13 years of records at Kootenai Experiment Station in northern Idaho and the two years of records at Gray's Lake in eastern Idaho, was continued. The data include 64-tank years of records of growing wheat, 4 of Alaska peas, 8 of oats, 24 of alfalfa, 9 of Canadian thistles, 13 of cat-tails and tules, 10 from bare land and 4 of wild hay, as well as evaporation and climatological data for the period of record at each station."

Snow Surveys and Irrigation Water-Supply Forecasts

Western Montana, Western Wyoming, Northern Nevada, Idaho, and Washington - James C. Marr, Boise, Idaho, reports: "In company with R. A. Work, most of the snow courses in southern Idaho were visited and the cooperators who attend to the snow surveys were contacted. The matter of installing snow-course markers was taken up with Mr. Rogers of the Yellowstone National Park and we have since been notified that it will be all right to place the small tin markers on iron posts set in concrete at each end of the park courses. Arrangements were made at the office of Region No. 4 in Ogden to continue the cooperation with the Forest Service throughout the Region in accordance with an informal agreement which will be drawn up to the satisfaction of both the Forest Service and the Soil Conservation Service . * * * Information was obtained in a number of places concerning equipment for traveling on snow. Manufacturing plants for the Sno-plane were visited at Jackson and Afton, Wyoming. The Utah Agricultural Experiment Station machine shop at Logan and the Montana Agricultural Experiment Station machine shop at Bozeman where snowmobiles have been constructed on an experimental basis, were visited.

Colorado, Eastern Wyoming, Eastern Montana, South Dakota, Arizona, New Mexico - R. L. Parshall, Fort Collins, Colo., reports: "A snow-survey shelter cabin was under construction and practically completed on North French Creek snow course in the Medicine Bow National Forest in southern Wyoming. Arrangements are now being made to provide a similar cabin at the Trickle Park Reservoir on Grand Mesa near Grand Junction,

Colorado. These cabins are of prime importance in carrying on our snow survey work, as they provide a haven for the snow surveyors where long trips on skis or snowshoes are necessary to get to the area where the surveys are to be made. In these cabins will be stored provisions, wood, and other essential supplies to provide safety and comfort for the men while in the field. It is fortunate that over the past nine years no accidents occurred to mar the safety record of our work and it is our ambition to maintain this record."

9/26/44